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Editorial

The art and science of business analytics: A journey from data to action

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ABSTRACT

Business analytics is a balanced mix of art and science, where methods form the structure, and visualization breathes meaning and creativity into it. The key to success in problem-solving lies in the art of asking the right questions. Successful problem-solving combines curiosity and courage to challenge assumptions, pushing beyond the obvious to uncover hidden insights. The transition from investigation to creation in problem-solving follows the path of scientific inquiry, where a clear purpose guides every step. Models are like maps; even the most detailed and complete maps are pointless without a clear destination. Just as an artist requires the right brush to bring their ideas to life, a model requires quality data to uncover transformative insights. Model-building is an art of precision and humility, where knowing the boundaries sparks innovation, and failure becomes our most influential teacher. It is a dynamic process of experimentation, where each repetition refines our approach, and continuous iteration leads us to a broader perspective and deeper understanding. Business analytics is a powerful blend of imagination and rigor, where creativity and precision join to drive change. Models are more than equations and algorithms; they are dynamic and evolving reflections of real-world complexities. When the art and science of problem-solving successfully converge, they illuminate the journey from data to insightful actions.

Decision-making is a balance of emotion and logic; too much of either can lead to devastating consequences. Depending on our choices, it can be deeply fulfilling — or painfully regrettable. Decision-making is the cornerstone of success — or failure in the dynamic and competitive world of business. Some decisions are deliberate, and others are subconscious. Decision-making is a universal dance, whether choosing between two steps in a tango or sending humans to the Moon. Business analytics combines science's precision with art's creativity to build a robust framework for transforming data into insight. It is a symphony where scientific methodologies harmonize with artistic creativity. Science is the skeleton — facts, methods, and algorithms — while art is the muscles and skin, infusing the structure with life, complexity, and elegance. Together, they orchestrate decisions that balance scientific rigor with artistic imagination. The true power of analytics lies in balancing the scale of artistic problem formulation with scientific problem-solving to ensure that neither creativity nor precision dominates but instead works together to drive impactful actions (see Fig. 1).

The interplay between art and science is especially crucial in problem formulation. To solve a problem, we need to identify the right problem first. Crafting the canvas before the scientist picks up the brush is the art of problem formulation. This challenge is not unique to business analytics. Consider the lessons of history from NASA's most infamous failures — Apollo 1, Challenger, and Columbia — failures that were not due to science. The data was there, and the calculations were rigorous. However, the art of creative problem formulation fell short. Building rigorous models within numbers, formulas, and algorithms is structured and systematic. But art lies in a more uncertain world, requiring the courage to embrace the unknown and look beyond the obvious.

Problem-solving is a balancing act. Imagine a three-legged stool where intuition, analytics, and judgment form the legs. Without intuition, decisions can become structured, relying on numbers. Without analytics, intuition runs wild, unchecked by evidence. Without judgment, we lose the big picture and generate solutions that may fail to withstand scrutiny. Business analytics is often messy and complicated. It requires juggling data with intuition, reason with emotion, fact with fiction, cognition with sensation, and known with unknown. Some problems are simple, like choosing between two steps in a dance, while others are complex, like sending humans to the Moon, pushing us out of our comfort zones. Successful business analytics hinges on mastering the art of asking the right questions and the science of applying the correct methods. The collision between creativity and precision sparks ingenuity that can solve the most challenging problems and transform decisions into courageous actions.

Problem formulation begins with an endless appetite for curiosity. We must approach data not with assumptions but with an open mind to seek patterns and outliers. We must listen to the data, immerse

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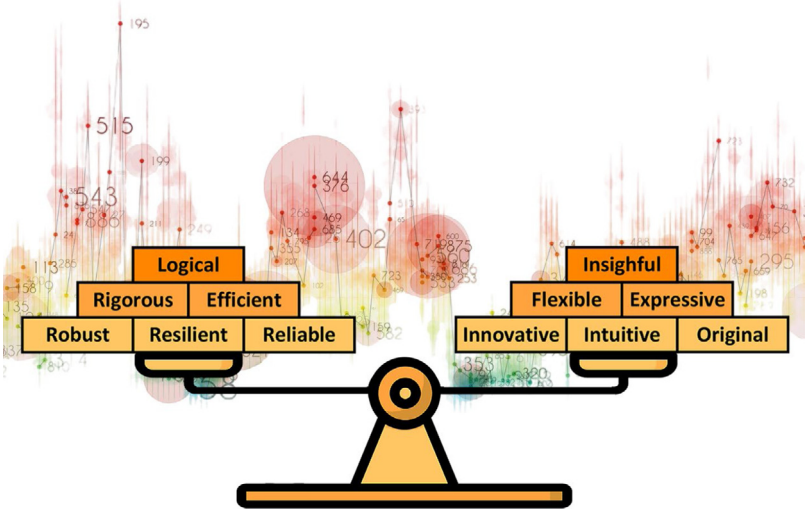

Fig. 1. Balancing artistic problem formulation with scientific problem-solving.

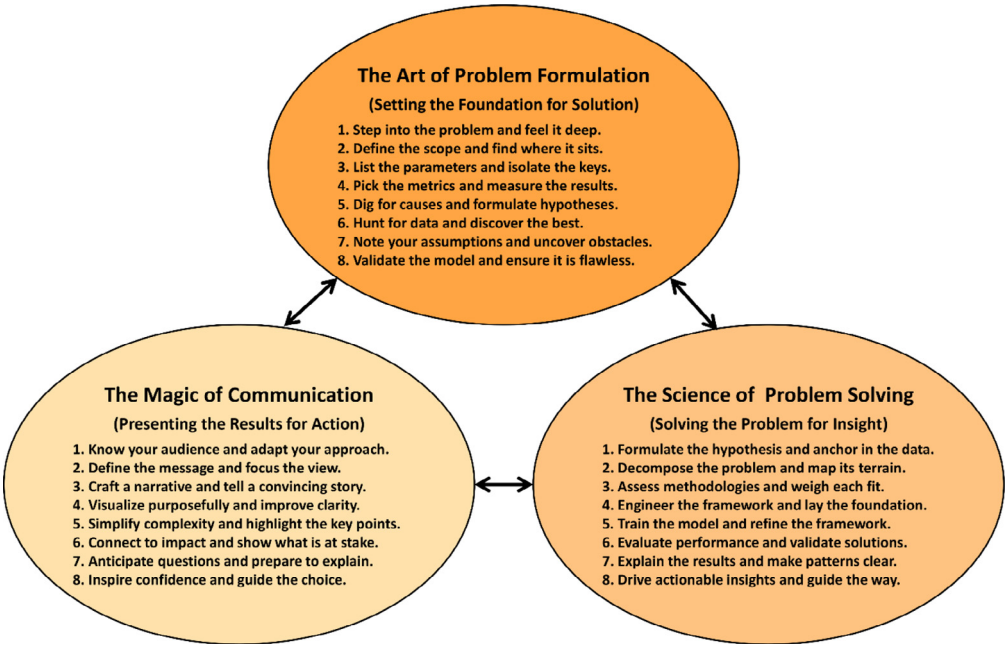

Fig. 2. The journey from formulation to solution and communication.

ourselves in the problem, and look for challenges and overlooked opportunities. We need intuition as our compass to formulate a problem effectively. We must step into stakeholders' shoes and understand their pain, frustrations, challenges, aspirations, motivations, and dreams. Great problem solvers are not number crunchers—they connect with the human stories behind the data to uncover what is happening and why it matters.

A well-formulated problem is like a fine orchestra where every piece has a purpose, and every note is intentional. It is like a fine wine—carefully crafted and designed to age well with time. It is specific enough to guide analysis and broad enough to inspire creativity. A good problem asks, "How can we optimize supply chain efficiency?" rather than "What's wrong with our supply chain?" The former provides direction; the latter leads to ambiguity. Great problem formulation requires challenging assumptions, dismantling biases, and resisting the temptation to chase the obvious. Sometimes, the real problem is not the loudest voice in the room but the quiet and overlooked one. Problem solvers must ask themselves: are we solving the right problem or obvious problem? The courage to look deep leads us to the art of problem formulation, where the real skill is asking questions that unlock potential—questions that spark not just analysis but imagination. These questions are not just inquiries; they are the bridges from confusion to clarity, data to insight, and insight to action. The questions we ask are the key to the answers we find. Make these questions bold, precise, and transformative.

In the dance between art and science, problem formulation is not a step—it is the rhythm shaping the performance and setting the pace for every step in the dance. Asking the right questions is just the beginning. Once the canvas is primed and ready for painting, the scientific approach leads the transition from questions to solutions. Robust model-building starts with a clear path to solutions. The goal defined during the problem-solving is a guiding principle that shapes choices. We cannot develop a model in a vacuum. Models must be crafted within a dynamic environment to handle specific problems, offer clear solutions, and generate insights to drive impactful decisions.

Once the purpose is clear, the next step is data. Models are the

engines in analytics, and data is their fuel. Like a high-performance engine, the quality of the fuel determines the result. Clean, relevant, and well-structured data is crucial. The challenge in business analytics is to uncover hidden patterns and organize raw data into meaningful information. Data preparation transforms disorder into order and confusion into understanding. Model-building frameworks thrive on the principles of experimentation and repetition. It is not about finding the perfect model—it is about finding the most suitable model. Should it be a simple linear regression or a neural network? A decision tree or a random forest? The answer lies not in blind commitment to complexity but in thoughtful alignment with the problem and the data. A model is a simplified depiction of reality. We must ensure models remain resilient with historical data and in the face of unforeseen future conditions through validation and testing.

The art of storytelling and solution communication transforms insights into compelling narratives. A model does not just predict or classify; it uncovers insights and convinces stakeholders to take action. The best business analysts are artists, scientists, and communicators capable of shaping insights into stories that inspire stakeholders to take decisive actions confidently. You can craft the perfect problem and the slickest solution, but if you cannot paint the picture, sell the story, and get stakeholders to act, it is just shelf decor collecting dust.

Achieving success in business analytics requires more than gathering data and running algorithms. It begins with thoroughly understanding the problem, followed by the methodical use of scientific methods, and ends with effectively sharing insights for meaningful actions. Problem formulation is about framing the right question. It is not enough to solve problems; we must first define them clearly and precisely. We can guide our analytical efforts effectively only by truly understanding the problem. Problem solving begins after problem formulation, where scientific methods extract and interpret data-driven insights and solutions. The transformation of insights into clear, convincing actions enables stakeholders to make decisions based on science and evidence (see Fig. 2).

No model-building framework is complete without the courage to embrace failure. Models do not always work as intended; sometimes, they fail miserably. In those failures lie opportunities for growth, learning, and innovation. Models are more than just equations; they are a dynamic, evolving, and adaptive reflection of real-world challenges. We must build them to solve problems, spark curiosity, inspire meaningful action, and guide the journey from data to action.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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